STUDIES OF EDUCATIONAL PRINCIPLES

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II. THE CONCRETE IN EDUCATION

For something over a generation, there has been a very definite reaction in our educational system against the abstractions which had grown up during the earlier period when education was primarily literary in its character. The charge is often made today that the older school which dealt chiefly with writing and reading gave children no sensory experiences, and no concrete material which they could carry in mind while they were learning the words in books, and while they were learning the elaborate forms of expression which were sometimes demanded of them in their reading lessons. The reaction against literary education has, in some cases, been so extreme as to suggest that reading and writing can be very largely left to take care of themselves; that the main business of the school consists in giving children new ideas about the material and social worlds. It is asserted that this larger information will stimulate a sufficient desire for reading, and will, at the same time, give the material knowledge for the interpretation of everything that is found in the books.

Certain changes in the methods of teaching reading have tended to encourage this reaction toward concrete experiences. Thus, we no longer give instruction in the alphabet as the first step in teaching reading because the letters of the alphabet are in no wise connected with the children's experiences of things and with their experiences of spoken words. We begin rather by giving the word-wholes which are directly related to objects and to the spoken words which children know. The word-whole thus has a concrete meaning attached to it from the very first, and the process of analysis into the separate letters is allowed to come at a later stage. This method of teaching reading emphasizes the value of the concrete.

Various types of concrete material have been welcomed into the course of study. In the first place, nature material has been regarded as entirely suitable for even the earliest grades. Children should have their attention turned to plants and animals because these are the most useful and attractive objects in the world, and observation of them fills the mind with material for later intelligent interpretation of the world.

Concrete material of the social type has also been suggested, and children have been encouraged to note the details of the manufacturing processes in which the community is engaged. Pupils have been encouraged to go to the markets where they can see the different products of the factories, and can become acquainted with importations from other parts of the country.

Further than this, children have been encouraged to see the importance of all kinds of constructive work. Here they are in contact with reality in a very direct fashion. When they take materials into their hands, and mold these into useful articles, they get a type of experience which is often described as very much more important than that which can be derived from descriptive accounts given in books.

Even the more abstract subjects which it is regarded as necessary to take up in the school have been given as concrete a character as possible. Thus, we find the books on algebra, and especially the books on arithmetic, filled with all sorts of examples about objects which are thought to be present in the child's experience, and doubtless have appeared before his eyes or have come into his hands. These objects are to be thought of as adjusted and readjusted in greater or less quantities, and the abstractness of mathematics is supposed to be corrected and the difficulty reduced because the child's interest is retained by reference to his ordinary experience.

Devotion to concrete experience is so typical of the educational thought of our day that it may seem bold to suggest any criticism of the interpretation which has been put upon the term "concrete" in our ordinary educational thinking. Furthermore, when one begins to call the concrete in question, he runs some risk of being regarded as opposed to all use of the concrete. It may be well to state, therefore, at the very beginning of this paper, that the present

writer wishes to be distinctly understood as advocating the proper use of all the concrete material that can be employed in the early and in the later stages of education. No return is advocated to the earlier type of formalism against which our present educational tendencies are a protest. This paper, however, aims to draw attention to the fact that the mere presentation of an object to the senses is in no wise a complete educational process; and the eliminating of language, or even its relegation to a place of secondary importance, is not justified by any careful analysis of the child's consciousness or by the demands for complete experience in any proper interpretation of that term.

Let us analyze a simple case which illustrates all of the advantages of concrete experience. The child is brought into contact with some external object, such, for example, as a piece of furniture. This piece of furniture may be forced upon his attentive recognition in a variety of ways. It will be very completely understood if he tries to go through the process of constructing the furniture. He will then become aware of the fact that the different parts of the chair are joined together, and that the joints each represent certain difficult problems in uniting the material which is employed in the construction of the chair. He will also realize that each line of the chair is the result of some careful constructive thought. He will see that the combination of materials is significant; that the different materials employed in different parts of the chair all have special justification. When the chair has been completed, he will have a large amount of direct personal experience which will attach itself to any image of a chair that now comes to his eyes. This fuller experience of chairs will be in part of the sensory type, but it will be in very large measure of the memory type; that is, all later chairs will be more fully recognized because of the one which he made. Furthermore, a very large part of this memory experience will be motor in its character; that is, it will consist of memories of certain types of behavior through which he has passed. The more completely these various types of personal behavior are aroused in his contact with things, the more completely will objects have concrete and vivid meaning to him.

This illustration makes it clear that the meaning of the term

"concrete" is not confined at all to that which appears before the senses at any given moment, nor is it confined entirely to visual or tactual experience. The weaving together of a large number of sensory experiences in some definite relation to personal memories is what is meant by concrete in such a case as this.

Let us turn from this illustration to the wholly different experience which is presented when objects are discussed in arithmetic as a means of giving concrete character to number problems. The child is asked to represent to himself three men working on a certain piece of work which requires their combined effort for two days and a half; the problem being to discover how many men will be necessary to complete the work in half the time if all worked at the same rate as the three who were originally given in the problem. If the child is able to deal with such situations at all he will instantly turn each of these statements into symbols which convert the situation into an arithmetical situation rather than into a situation to be worked out in any concrete, personal way. Indeed, it is the intention of the arithmetic lesson to show him a method of treating this problem of work which is wholly at variance with the method that he would employ if he came into contact with it through his own personal efforts. It is not that he is to dig the ditch, nor to go and see men dig the ditch. He is not to sympathize with their efforts. He is shown through his study of arithmetic a short cut which has been devised at great intellectual expense by the race for the purpose of making it unnecessaay for him or any of his friends to go through the concrete experience of working out the ditch in the two ways contrasted in the problem. He can work out the readjustment of the men and work, as Professor Stout puts it—"in his head." Arithmetic is a short abstract method of working out a problem which it would be quite impossible to work out with anything like the same rapidity "in the concrete."

One sees from such examples that just in so far as a child is trained in the methods of dealing with objects through arithmetical rules, he is taken away from the concrete manipulation of objects.

Another very good illustration of similar type is to be found in our ordinary experience with spatial dimensions. If one wishes

to find out how much paper he needs to cover a certain wall, he does not take the rolls of paper in his hand, and by long and laborious experiments, find out how much of that paper will be needed to cover the wall. He would indeed derive many very concrete experiences in an effort to cover the wall with the paper. He would learn some of the difficulties of handling and manipulating the paper. He would become acquainted with the different devices for making the paper stick to the wall, and would see the difficulty of keeping it smooth, etc. He might have the concrete experience of the paper-hanger, but the ordinary individual needs such experience, if at all, only as an introduction to another and more abstract form of knowledge. He usually wishes to know how far he, as the purchaser of paper, must go in preparing for the fuller concrete experience of someone else who will do the hanging of the paper on the wall. Fortunately he finds himself supplied through racial experience with the very convenient device of measurement. He measures one roll of paper, he measures the wall, and he finds without any actual handling of the paper, or further consideration of it in detail, that he is able through arithmetical devices to work out the amount of paper that he must purchase.

Arithmetic is thus a substitute for concrete experience and a very convenient substitute. When we are trying to cultivate the methods of arithmetical reasoning, we find ourselves continually drifting away from the necessity of handling concrete objects with which we deal. Any observation of children in the schools will make it perfectly clear that where examples have been mastered, they are taken up, not in a concrete way but in an abstract arithmetical way, which is entirely legitimate, and highly economical of human energy.

What has been said with regard to arithmetic may be repeated in kind for our treatment of experiences through the use of words. If one owns a piece of farm-land he may go over the ground very carefully, and become acquainted with its character by actual contact with it. Its distances may be measured by actual movement across it. The thickness of the soil may be tested by actual labor. In these and other ways one may gain concrete knowledge of land. It does not follow, however, that one will have the highest

and most complete knowledge of his farm through this direct contact with it. Indeed, all of our experience with scientific improvement of farming shows us that it is not the person who is most concretely acquainted with a piece of land who is usually in a position to make the most important suggestions about it. It is more important that one should be able to apply to the land a vast body of knowledge which has been written down in the books of science, in the form of words. These words are not actual pictures of the landscape, nor are they the concrete experience which would be derived by going over the land. The problems of farming have all been turned into certain verbal symbols which help us to concentrate many different kinds of experience first "in our heads." The land is rolling, for example, or it is very level; the land has a thick soil or a thin soil; the land has good drainage or poor drainage. As soon as these various words have been substituted for an actual muscular experience of contact with the land itself, we are in a position to bring to bear upon the problem of dealing with the land much descriptive material which has been carefully worked out and recorded in bulletins of the Agricultural Department or in books on agriculture. To be sure, these books on agriculture never can be complete substitutes for the kind of experience that one would get in actual contact with the soil, but the two types of experience are supplementary and not identical in character. They were never intended to be substitutes for each other, and he who would neglect the ability to turn experience into words and work them over "in the head," is forgetting an important fact of human nature just as much as he who would deal with words alone is neglecting an important fact of human nature.

The words are means and devices for a most significant mode of dealing with the world, and just in so far as this significant mode of dealing with problems is cultivated, and its methods are mastered, will the learner become superior to the person who merely comes into concrete contact with objects and does not think about them.

Putting the matter which has been discussed in the last paragraph in a more general form, we may say that science is superior to mere contact with objects just because science is more comprehensive and general than the concrete. The scientist who knows

about birds and plants does not merely have more sensory experiences than the ordinary individual. Such a scientist is indeed likely to come into contact with more objects than the ordinary individual because he goes and seeks this kind of experience; but the essential fact in his scientific thinking is that he takes some common experience and relates it to the large body of knowledge which the ordinary individual never takes up. The methods by which this large body of additional knowledge is brought to bear upon present experience is not the method of mere sensory contact with the object, it is rather the method of reasoning. Such thoughtful reasoning involves the use of a highly developed scientific terminology and a body of reference material which would be utterly unmanageable without the aid of language.

It is time that someone suggested in regard to the nature-study movement, that it is not the bringing of objects into the schoolroom which will give the scientific attitude: it is rather thought about these objects, and careful inference based upon objects that will train children in scientific modes of thought. Careful inference can in no proper sense of the word be described under the term "concrete." No scientist is satisfied to look at the things about him. His largest generalizations always carry him away from these concrete facts, into the realms of thinking. It is into these realms of thinking that the child must be carried if he would see the large significance of the experiences that are presented to him. The turning of experiences into words is therefore to be recognized as an abstract method of dealing with the world supplementary to the concrete manipulation of objects. He who stops and thinks about the situation is not dealing with that situation primarily through his senses or with his hands.

Let us consider another type of illustration which is very common in our schools today. A great effort is being made in some of the schools to combine elementary science and cooking. Children are brought into contact with the operations of the kitchen on the assumption that as soon as these operations involve certain scientific principles the scientific principles should be worked out both as cooking and as science.

A brief review of the history of the race would seem to be enough

to convince the enthusiast that cooking and science are not necessarily related. Practical operations in cooking were brought to a degree of perfection long before there was a chemistry of foods. On the other hand, the chemistry of foods has gradually arisen in remote laboratories which are very far from the kitchens where most of the actual food of the race has been prepared. The chemistry of organic substances is a highly developed form of science which involves some of the most elaborate technique that is at the command of trained scientists.

Any psychological analysis of the cooking activity and of the thought processes on the part of the organic chemist, ought to convince the student of domestic science that these two forms of experience are at least not identical. To boil common potatoes in water on the one hand and to recognize starch in unboiled potatoes by the iodine test on the other, are two totally different attitudes toward potatoes. It is very doubtful whether, in the earlier years of the child's life, there is any possibility of bringing together these two attitudes. They are likely to be disturbing to each other. They are undoubtedly capable of being related to each other at some stage of education, but they do not flow at once into each other.

The above examples have been chosen for the purpose of making it as clear as possible that in our school work we are constantly training a great variety of different attitudes towards things. In the use of tools and in the use of words we are training different modes of treatment of the world. One of these modes of treatment is the constructive mode, another mode is the arithmetical mode of treatment, a third is the verbal mode of treatment, and so on down the list. The reason why the school has to treat these different types of relation to the world separately is that each has its own independent justification, and its own definite character. We ought not to make the mistake of thinking that we can substitute the arithmetical attitude for the constructive attitude. On the other hand, it should be noted with perfect clearness that there is no remote possibility of substituting the constructive attitude for the arithmetical attitude. While the school of the last generation was in some danger of assuming that its work was done when it

taught the arithmetical attitude, there are certain examples in our generation of a tendency to make the mistake of believing that the work of the school is done when the constructive attitude has been trained.

We must recognize that the term "concrete" has its place in our education just so far as we can show the legitimacy of concrete reactions upon the external world. Abstract training can be justified with equal emphasis and we are justified whenever we point out that abstract methods of treating the external world are of advantage to the individual. We should no more eliminate abstractions from our school work than we eliminate abstractions from our ordinary life. Indeed the abstract has superior virtues which have been touched upon in the foregoing illustrations. There is danger that these virtues will be overlooked in the enthusiasm for concrete experience which is characteristic of our present-day education.

[*To be continued*]